

09/955,517G0228/AMDP753USREMARKS

Claims 1, 2, 4-6, 9-12 and 15-26 are currently pending in the subject application and are presently under consideration. Claim 26 has been amended herein. A listing of all pending claims is on pages 2-6 of this Reply.

It is noted that the invention of the primary reference (Subramanian *et al.* (US Patent No. 6,562,248 B1)) was subject to an obligation of assignment to the assignee (Advanced Micro Devices, Inc.) of the present application at the time of filing, and therefore a rejection under 35 U.S.C. §103(a) would not be proper pursuant to 35 U.S.C. §103(c).

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-2, 4-6, 9-12, 25 and 26 Under 35 U.S.C. §102(e)

Claims 1-2, 4-6, 9-12, 25 and 26 stand rejected under 35 U.S.C. §102(e) as being anticipated by Subramanian *et al.* (US Patent No. 6,562,248 B1). It is respectfully submitted that this rejection should be withdrawn for at least the following reasons. Subramanian *et al.* does not anticipate each and every element as set forth in the subject claims.

A single prior art reference anticipates a patent claim only if it expressly or inherently describes each and every limitation set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the ... claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The claimed invention relates to a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in alternating aperture phase shift masks employed in semiconductor manufacturing. Independent claims 1, 25 and 26 recite similar limitations, namely: a system that measures an etch of a mask feature, comprising, one or more mask creating components that fabricate one or more features on an

09/955,517G0228/AMDP753US

alternating aperture phase shift mask; a driving component that controls the one or more mask creating components; an emitting component that directs light on to at least one of the features on *the alternating aperture phase shift mask*; and an analysis component that measures one or more features, the measured feature parameter utilized by the driving component to control the mask creating component during fabrication process and post-fabrication process in *an alternating aperture phase shift mask*. Subramanian *et al.* does not expressly or inherently disclose the aforementioned novel aspects of applicants' invention as recited in the subject claims.

Subramanian *et al.* discloses a system for monitoring and controlling aperture etching in a complimentary phase shift mask. The system includes one or more etching components operative to etch portions of a mask; an etching component driving system; a system for directing light onto the apertures; a measuring system for measuring aperture parameters; a scatterometry system for processing the light reflected from the apertures; and a processor for receiving aperture data and mapping the mask into a plurality of grid blocks. (See Col. 15, lines 15-40). The cited reference fails to expressly or inherently disclose a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in *alternating aperture phase shift masks*.

More specifically, the Office Action contends that the complimentary phase shift mask and alternating aperture phase shift mask are the same and the apparatus disclosed is inherently capable of being used for creating either of the phase shift masks (See Page 3 of the Office Action dated August 25, 2005). Applicants' representative respectfully disagrees with the Examiner's contentions. Subramanian *et al.* does not expressly or inherently disclose a system that facilitates the fabrication of apertures in an alternating aperture phase shift mask, but is instead limited to a system that controls the fabrication of aperture etching in a complimentary phase shift mask. A complimentary phase shift mask is inherently different from an alternating aperture phase shift mask.

A complimentary phase shift mask is created by a two-step masking process. In the masking process, two masks are used to expose a gate layer. Generally, a phase shift mask creates null regions wherever there is a 180-degree transition. In some instances, these nulls may form in regions where it is not desirable to form a feature in the underlying photoresist layer. Complimentary features may be added around these

09/955,517

G0228/AMDP753US

features to produce a periodic structure that allows for improved resolution of the lithographic process. The effects created by the complimentary features may require the light passing through the features to have its phase shifted. In complimentary phase shift masking, light passing through one or more masks may be phase shifted to facilitate selective interference and cancellation of light waves. A second masking operation is performed after the phase shift masking operation. In this second masking operation, the complimentary features are obliterated by exposure to light passing through a second mask prior to forming the patterned resist layer. The second masking operation is typically performed using a binary mask which prevents exposure of the photoresist layer where features are desired and allows exposure of the photoresist layer in the other regions. The second mask provides for improved contrast that enables more precise feature shapes. Since the two masks are exposed consecutively, overlay is important. To take advantage of complimentary phase shift masking, precise control of the depth and/or width of the openings in the complimentary phase shift masks is required. (See Col. 2, lines 54-67 and Col. 3, lines 1-10).

Unlike the complimentary phase shift mask, an alternating aperture phase shift mask is created by a one-step masking process. Typically, transparent films are deposited over the desired transparent areas using a second level lithography and etch technique or vertical trenches are etched directly in the substrate. This creates transmission regions on either side of a patterned opaque feature, with one of these transmission regions being phase-shifted from the other. Controlling the width and depth of these regions etched into the substrate is required to enable controlled phase shifting of light that will pass through the mask. Thus, Subramanian *et al.* is silent regarding a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in *alternating aperture phase shift masks*. Accordingly, Subramanian *et al.* does not disclose each and every element as set forth in the subject claims.

In view of at least the above, it is readily apparent that Subramanian *et al.* fails to expressly or inherently disclose applicants' claimed invention as recited in independent claims 1, 25 and 26 (and claims 2, 4-6 and 9-12 which respectively depend therefrom). Accordingly, it is respectfully requested that these claims be deemed allowable.

09/955,517G0228/AMDP753US**CONCLUSION**

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [AMDP753US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

AMIN & TUROCY, LLP



Himanshu S. Amin
Reg. No. 40,894

AMIN & TUROCY, LLP
24TH Floor, National City Center
1900 E. 9TH Street
Cleveland, Ohio 44114
Telephone (216) 696-8730
Facsimile (216) 696-8731